Calc AB

Lesson 60

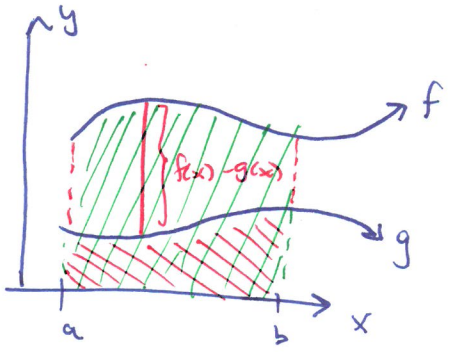
10/27/15

Agenda: 10/27/15

HW Leader

Lesson 60

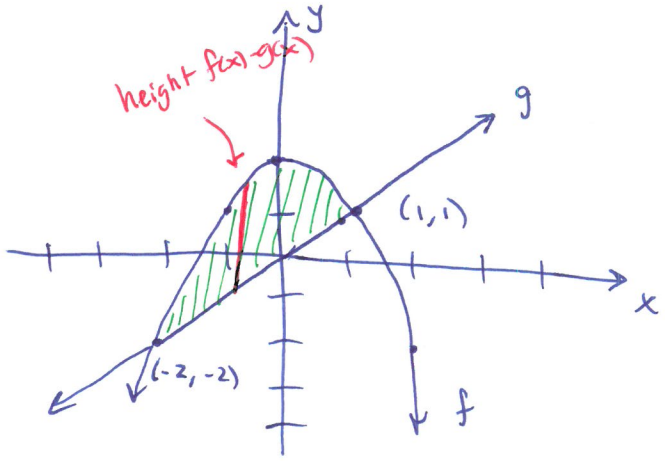
Area Between Two Curves



For two non-negative fingtions f and g the Area between the two curves is the difference in area of the top and bottom function.

$$\text{Area between} = \int_a^b \underbrace{(f(x) - g(x))}_{\text{height of rectangle when } f \geq g} dx$$

Ex. 60.2 Find the area of the region completely bonded by the graphs of $f(x) = 2 - x^2$ and $g(x) = x$.



$$\text{Area} = \int_{-2}^{1} (f(x) - g(x))\,dx$$

$$= \int_{-2}^{1} (2 - x^2 - x)\,dx$$

$$= \left(2x - \frac{x^3}{3} - \frac{x^2}{2}\right)\Big|_{-2}^{1}$$

$$= \left(2 - \frac{1}{3} - \frac{1}{2}\right) - \left(-4 + \frac{8}{3} - 2\right)$$

$$= 8 - \frac{9}{3} - \frac{1}{2} = \boxed{\frac{9}{2} \text{ units}^2}$$

Ex. 60.4 Find the area of the region bonded by the graphs of $y = x^2$ and $y = 2x^2 - 4$.

$$\text{Area} = \int_{-2}^{2} (x^2 - (2x^2 - 4))\,dx = \int_{-2}^{2} (-x^2 + 4)\,dx$$

$$= \left[-\frac{x^3}{3} + 4x\right]_{-2}^{2} = -\frac{8}{3} + 8 - \left(\frac{8}{3} - 8\right) = 16 - \frac{16}{3} = \boxed{\frac{32}{3} \text{ units}^2}$$